



July 1996

BALLISTIC MISSILE DEFENSE

Issues Concerning Acquisition of THAAD Prototype System



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National Security and
International Affairs Division

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Congressional Committees

The Ballistic Missile Defense Organization and the Army plan to acquire a Theater High Altitude Area Defense (THAAD) User Operational Evaluation System (UOES)—an early prototype version of the final THAAD system. UOES is intended to (1) allow military users to influence the THAAD system design, (2) permit an early operational assessment of the system's capabilities, and (3) provide a system that could be deployed in a national emergency. UOES will consist primarily of refurbished components acquired for the system's demonstration and validation phase, although the Army plans to purchase 40 UOES interceptors to provide the deployable system capability.

Pursuant to our basic legislative responsibilities, we reviewed the THAAD UOES program to determine whether planned testing would reasonably demonstrate the capabilities of UOES as an interim system before funds are committed to interceptor production. We are addressing this report to the committees of jurisdiction because it identifies problems and calls for corrective action that the Department of Defense (DOD) has indicated an unwillingness to take. We are suggesting that the Congress may wish to take the necessary action to ensure that DOD addresses the problems we have identified. This report does not address the overall value of the THAAD system.

Background

THAAD is a ground-based weapon system being developed by the Ballistic Missile Defense Organization and the Army to defeat theater ballistic missiles by colliding with them while in flight. The system supports the national objective of protecting U.S. and allied deployed forces, population centers, and industrial facilities from theater missile attacks.

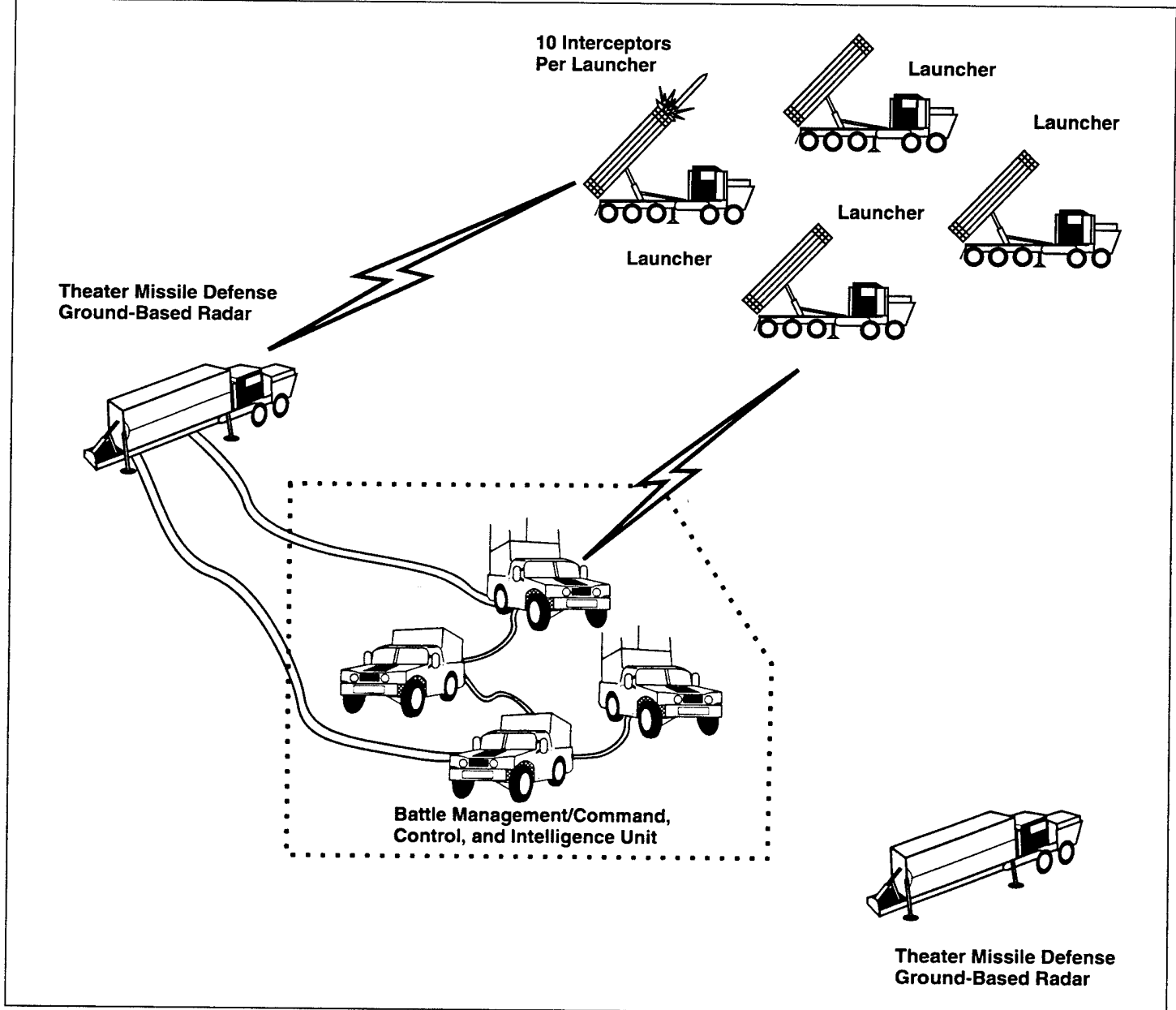
The total estimated cost for THAAD is \$16.7 billion, and the system is currently in an early phase of development called demonstration and validation. A decision on whether to proceed into the engineering and manufacturing development phase is scheduled for March 1997. A production decision is planned for early 2003, and initial fielding is currently scheduled for 2006. DOD's budget submission for fiscal year 1997 requests \$481.8 million for the program.

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Ballistic Missile
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The fiscal year 1996 National Defense Authorization Act requires a contingency capability—THAAD UOES—by fiscal year 1998. UOES will consist of 40 interceptors; 4 launchers; 2 radars; 2 battle management/command, control, and intelligence units; and associated support equipment. Except for the 40 interceptors, these components have already been acquired under the existing THAAD demonstration and validation contract. The components are to be refurbished for use in the UOES system. The 40 interceptors are yet to be acquired under an option to the demonstration and validation contract. Figure 1 shows the principal UOES components.

Figure 1: THAAD—UOES



Results in Brief

Current plans require the Army to commit funds for producing 40 UOES interceptors well before testing provides assurance of the UOES system's capabilities, even though the THAAD program has already experienced significant cost, schedule, and technical performance problems. According

DTIC QUALITY INSPECTED 3

to the Army, sufficient data for a limited assessment of UOES operational effectiveness¹ will not be available until limited user tests are completed in early 1998. As a result, DOD's plan to commit funds in 1996 in order to meet an operational THAAD UOES capability requirement by fiscal year 1998 risks acquiring a system that might not be capable enough to warrant its deployment in an emergency.

Our review indicated that (1) the contractor's cost estimate for the THAAD UOES interceptors has more than doubled since 1992 and is likely to increase further and (2) test schedule slippage, increased delivery lead times, and funding limitations have delayed the availability of UOES interceptors by about 2 years. Further, airborne deployment of the THAAD UOES may be difficult since it is ultimately contingent upon successfully competing with other military hardware for scarce airlift resources.

Primary Purpose of Interceptors Is Deployment Capability

Initially, the Army had no specific plans to test the 40 UOES interceptors. However, in 1995, the Ballistic Missile Defense Organization's general counsel ruled that use of research, development, test, and evaluation funding to acquire the interceptors would be justified only if (1) there were a planned intent to use them in early testing, (2) they were not principally intended for operational purposes, and (3) they were necessary to provide an adequate number for testing. In response to this ruling, the THAAD Project Office developed a test plan for the interceptors, but recommended that it not be implemented. The Ballistic Missile Defense Organization instructed the Project Office to implement the test plan.

Since that time, circumstances have changed. Part of the test plan has become obsolete, and other parts can be accomplished with equipment other than the 40 UOES interceptors. Five of the UOES interceptors were to serve as backups in tests that have now been canceled; another four interceptors were planned as backups for engineering and manufacturing development tests; and one was planned as a backup to a limited user test. As a result of changes in planned demonstration and validation phase testing, it now appears that an adequate number of backup interceptors will be available for engineering and manufacturing development and

¹DOD defines "operational effectiveness" as the overall degree of mission accomplishment of a system when used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, tactics, survivability, vulnerability, and threat.

limited user tests without the UOES interceptors.² The remaining 30 UOES interceptors were to be used in operational suitability tests that did not involve firing interceptors. However, the purposes of those tests can be accomplished with training rounds or with the backup demonstration and validation phase interceptors.

UOES Funding Will Be Committed Before System Capabilities Are Known

The Army anticipates exercising the contract option for the UOES interceptors in the 3rd quarter of 1996 based on the results of only the first 7 of 14 scheduled demonstration and validation flight tests. The Under Secretary of Defense (Acquisition and Technology) established one successful intercept of a target while using the THAAD radar to guide the interceptor as minimum criteria for exercising the contract option for UOES interceptors. Test flight 7, currently scheduled for about July 1996, will be the first intercept attempt using the THAAD radar. Through May 1996, the Army had conducted five flight tests. Only two of the five tests were designed to intercept a target and both intercept attempts failed. According to the Ballistic Missile Defense Organization and the Army, seven tests will not be sufficient to characterize operational effectiveness in such areas as mission performance and supportability.

The Army also plans to conduct a 7-week limited user test after completing the 14 demonstration and validation flight tests. The limited user test will build on the results of the demonstration and validation flight tests and focus on operational effectiveness and suitability issues, including mission performance and system supportability. The primary events to be conducted during the limited user test will be field training exercises, command post exercises, modeling and simulations, and a flight test using an interceptor already under contract. Results from the limited user test are not scheduled to be available until early 1998.

According to DOD's Joint Staff, information currently available is not sufficient to characterize UOES operational effectiveness. Representatives of the Joint Staff told us that if a national emergency occurred, the national command authority would decide whether to deploy THAAD UOES based on the threat at that time and whatever data was known about UOES effectiveness. They agreed, however, that better data for making a deployment decision would be available at the completion of the limited user tests. The Joint Staff representatives also told us that some theater

²The Army purchased 20 interceptors for demonstration and validation flight tests, but now plans to use only 14 in these tests. Of the remaining six interceptors, one is scheduled for a flight test during the limited user test and the remaining five can be used as backup to the four engineering and manufacturing development tests and the limited user test.

commanders place a high priority on THAAD's intended capabilities. The Joint Staff expect that at the completion of the demonstration and validation flight tests and the limited user tests, sufficient information will be available to characterize UOES operational effectiveness. However, under the current plan, results from the limited user tests are not scheduled to be available until about 1-1/2 years after the Army exercises the contract option for the 40 UOES interceptors.

Airlift for UOES Will Be Scarce

The airlift requirement for UOES will be significant. The Army estimates that to transport the full system with 40 interceptors from the United States to a theater of operation will require up to 18 C-5, 26 C-17, or 40 C-141 flights. The Army estimates that a UOES initial force, or "minimum launch capability," including 1 radar, 2 launchers, and 20 interceptors, could be deployed with 7 C-5, 9 C-17, or 13 C-141 flights. However, whether for a complete UOES deployment, or a minimum launch capability, the necessary flights may not be available unless UOES is afforded a high priority. In September 1995, the Ballistic Missile Defense Organization's Annual Report to the Congress stated that deciding what assets should be transported in the crucial first days of an overseas campaign will present a critical challenge and that the need to transport large inventories of equipment to regional theaters of operations will stress airlift capabilities. Representatives from the Joint Staff told us that THAAD UOES would likely have a high priority for airlift resources. However, other systems may also have a high priority. For example, the Army plans to begin fielding 1,200 Patriot Advanced Capability-3 interceptors in 1999, which could compete with the 40-interceptor THAAD UOES for airlift resources.

Cost Estimate Has Increased

Since September 1992, when the THAAD demonstration and validation contract was awarded, the contractor's cost estimate for the 40 UOES interceptors has increased by over 100 percent—from \$80 million to \$165 million. According to THAAD project officials, the contractor's estimate is likely to increase further because funding for the interceptors has been stretched out over a 4-year period and the delivery period has been extended from 29 months to 34 months. The estimated cost for spares, support equipment, and contractor support increases the estimated total cost of a UOES deployment option by another \$55 million—to a total of \$220 million.

At our request, THAAD project officials categorized the interceptor cost increase. They stated that the increase in interceptor cost is due to

technical, estimating, and schedule changes. Technical cost increases result from design changes to the interceptor's seeker, booster, and divert and attitude control system. Estimating cost increases result from correcting errors in the initial cost estimate and shifting other costs from the contractor to the government. Schedule cost increases occurred because the time from exercising the contract option to final delivery grew from 18 to 29 months.

Availability of the UOES Interceptors Has Been Delayed

Final delivery of the 40 UOES interceptors has been delayed about 2 years—from the 2nd quarter of 1997 until the 2nd quarter of 1999. Under the current schedule, UOES interceptor deliveries would begin in 1998. At the end of fiscal year 1998 when the 1996 Defense Authorization Act requires the UOES capability, only 14 interceptors will be available. Exercising the option for the UOES interceptors has been delayed about 10 months, from October 1995 until about August 1996, and the time from exercising the option to final delivery has increased 16 months.

The 10-month delay results from slips in the demonstration and validation flight test schedule. These slips occurred largely because of scheduling difficulties at the test range and the failure to intercept the target during test flights 4 and 5—the first two tests designed for target intercept. The Army maintains that a successful intercept using a test range radar to guide the interceptor should occur before attempting an intercept with the THAAD radar. The Under Secretary of Defense (Acquisition and Technology) is requiring the Army to conduct a successful intercept using the THAAD radar before it can exercise the option for UOES interceptors. The first intercept attempt relying on the THAAD radar is now planned during test flight 7 in the July 1996 time frame.

The 16-month delay in delivery results from (1) extended lead times—from 18 to 29 months—in delivery of some interceptor components and (2) reduced fiscal year 1997 funding that further extended final deliveries from 29 to 34 months.

Conclusion and Recommendation

The current plan for acquiring THAAD UOES interceptors commits funds for interceptor production in about August 1996, well before testing in early 1998 provides some assurance of the system's effectiveness. In view of the risks associated with producing UOES interceptors before testing, we believe the Army should delay contracting for them until the testing is completed. Using 34 months as the time required from contract award to

final interceptor delivery, UOES would still be available as an interim system in late 2000. This is about 1-1/2 years later than currently planned but well before fielding of the final THAAD begins in the 2006 time frame.

Accordingly, to avoid committing over \$200 million for a system that may not have adequate operational effectiveness, we recommend that the Secretary of Defense (1) restrict obligational authority for UOES interceptors until the Chairman of the Joint Chiefs of Staff certifies that UOES has adequate effectiveness to merit deployment as an interim system and (2) seek legislative relief from the requirements of the 1996 National Defense Authorization Act in regards to acquiring THAAD UOES by fiscal year 1998.

Agency Comments and Our Evaluation

In commenting on a draft of this report, DOD disagreed with our recommendations, stating that THAAD UOES will serve three functions in priority order: (1) providing soldiers an opportunity to influence the system's design; (2) conducting early operational assessments of the system; and (3) if directed by the National Command Authority, providing a theater commander in chief with a limited missile defense capability. We do not disagree with these purposes and would point out that the two primary purposes of UOES set forth by DOD—early user influence on the design and system operation assessment—can be accomplished without contracting for the 40 interceptors. Moreover, the thrust of our report deals with the risks inherent in the Army's accelerated approach of contracting for interceptors to be deployed before testing provides assurance of the interceptor's effectiveness.

DOD stated that the requirement for successful hardware-in-the-loop testing of kill vehicle subsystems and one successful intercept using the THAAD radar will reduce the risk associated with contracting for the 40 interceptors. However, we note that these minimal criteria are even less than the three successful intercepts required for entering the engineering and manufacturing development phase. Our work has repeatedly shown that when production of weapon systems began on the basis of schedule or other considerations rather than on the basis of technical maturity, major design changes were often needed to correct problems. The design changes frequently led to additional testing and costly retrofit of units already produced.³

³See Weapons Acquisition: Low-Rate Initial Production Used to Buy Weapon Systems Prematurely (GAO/NSIAD-95-18, Nov. 21, 1994).

DOD stated that implementing our recommendation would cause a gap in production of interceptors between demonstration and validation and engineering and manufacturing development. However, DOD failed to point out that the current schedule already includes a production gap between demonstration and validation and engineering development and an even larger gap between completing production of interceptors for engineering development tests and the beginning of low-rate initial production. Implementing our recommendation would widen the gap between demonstration and validation and engineering development but decrease the gap between engineering development and low-rate initial production.

DOD also stated that implementing our recommendation would permit a UOES capability no sooner than fiscal year 2000, 2 years later than required by law. We recognize that implementing our recommendation would not allow DOD to provide a THAAD UOES capability by fiscal year 1998 as required by the 1996 National Defense Authorization Act. For that reason, we recommended that the Secretary of Defense seek relief from the act's requirement. However, under the current THAAD schedule, only 14 interceptors will be available at the end of fiscal year 1998. The Army's definition of "minimum launch capability" includes 20 interceptors or 6 more than will be available in fiscal year 1998. The full 40-interceptor capability will not be available until the 3rd quarter of fiscal year 1999, even if no additional schedule slips occur.

Matters for Congressional Consideration

Because DOD has clearly indicated its intention to commit over \$200 million for UOES interceptors that may have inadequate operational effectiveness and because the current schedule will provide only 14 of the 40 interceptors by fiscal year 1998, the Congress may wish to consider delaying the timetable for acquiring THAAD UOES set forth in the 1996 Defense Authorization Act. The Congress may also wish to restrict obligational authority for acquiring UOES until the Secretary of Defense certifies that the system has adequate operational effectiveness to merit its deployment in a national emergency.

Scope and Methodology

We performed our work at the Office of the Chairman of the Joint Chiefs of Staff, Office of the Secretary of Defense, Headquarters of the Ballistic Missile Defense Organization; the Department of the Army in Washington, D.C.; and the THAAD Project Office in Huntsville, Alabama. At these locations, we interviewed responsible agency officials and analyzed

pertinent documents. We obtained comments on a draft of this report from DOD. Those comments are discussed above and reprinted in appendix I.

We conducted our work from June 1995 to May 1996 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Secretaries of Defense and the Army; the Director of the Ballistic Missile Defense Organization; and the Director, Office of Management and Budget. We will make copies available to others upon request.

This report was prepared under the direction of Thomas J. Schulz, Associate Director, Defense Acquisitions Issues. If you or your staff have any questions concerning the observations expressed in this report, please contact him on (202) 512-4841. Major contributors to this report were Lee Edwards, Leon Gill, Stan Lipscomb, and J. Klein Spencer.

A handwritten signature in black ink, reading "Henry L. Hinton, Jr." with a stylized flourish at the end.

Henry L. Hinton, Jr.
Assistant Comptroller General

List of Congressional Committees

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Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



ACQUISITION AND
TECHNOLOGY

OFFICE OF THE UNDER SECRETARY OF DEFENSE

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113 MAY 1996

Mr. Louis J. Rodrigues
Director, Defense Acquisitions Issues
National Security and International
Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Rodrigues:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "Issues Concerning Acquisition of THAAD Prototype System," dated April 24, 1996 (GAO/NSIAD-96-136), OSD Case 1136. The DoD does not concur with the report's recommendations.

Specifically, the Department does not agree with the GAO's recommendation that the Secretary of Defense (1) restrict obligation authority for the User Operational Evaluation System (UOES) interceptors until the Chairman of the Joint Chiefs of Staff certifies that the UOES has adequate capability to merit deployment as an interim system, and (2) seek legislative relief from the requirements of the 1996 National Defense Authorization Act in regards to acquiring the THAAD UOES by fiscal year 1998.

The THAAD UOES serves three critical functions. In priority, they are to provide soldiers the opportunity to influence objective system design through early involvement in the execution of the weapon's test program; to provide early operational assessments; and, if directed by the National Command Authority, provide a theater Commander in Chief (CINC) with a limited missile defense capability which does not exist today. The Department's requirement for successful hardware-in-the-loop testing of kill vehicle subsystems, and one successful intercept using the THAAD radar, will reduce the risk associated with exercising the UOES missile option, and support meeting the fiscal year 1998 Congressionally mandated UOES date. Waiting until after the Limited User Test for the Chairman's certification would cause a break in demonstration/validation missile fabrication and provide the UOES capability no sooner than fiscal year 2000.

Next, the Department does not agree with the recommendation that the Secretary of Defense seek legislative relief from the



Appendix I
Comments From the Department of Defense

fiscal year 1998 THAAD UOES requirement. The recently completed Ballistic Missile Defense Program Review determined that a THAAD UOES capability was achievable by fiscal year 1998, and the restructured THAAD program supports that date. Again, the current THAAD UOES strategy will not only improve our objective system product, but also provide our warfighting CINCs a more capable theater missile defense architecture in the event of a national emergency. Delaying the THAAD UOES is not prudent.

The detailed DoD comments on the draft report recommendations are provided in the enclosure. The DoD appreciates the opportunity to comment on the draft report.

Sincerely,



George R. Schneider
Director
Strategic & Tactical Systems

Enclosure

Appendix I
Comments From the Department of Defense

GENERAL ACCOUNTING OFFICE DRAFT REPORT - DATED APRIL 24, 1996
(GAO CODE 707114) OSD CASE 1136

"BALLISTIC MISSILE DEFENSE: ISSUES CONCERNING ACQUISITION
OF THAAD PROTOTYPE SYSTEM"

DOD COMMENTS TO THE GAO RECOMMENDATIONS

RECOMMENDATION 1: To avoid committing over \$200 million for an interim system, which may have little or no operational capability, the GAO recommended that the Secretary of Defense restrict obligational authority for the User Operational Evaluation System (UOES) interceptors until the Chairman of the Joint Chiefs of Staff certifies that the UOES has adequate capability to merit deployment as an interim system. (p. 8/GAO Draft Report)

DOD RESPONSE: Nonconcur. Milestone I, in January 1992, established two exit criteria for the UOES missile option. Successful hardware-in-the-loop testing of kill vehicle subsystems, and one successful intercept using the THAAD radar, represent the minimum technical success required to reduce the risk associated with exercising that option. Adhering to those established criteria will enable the THAAD program to meet the requirement of the 1996 National Defense Authorization Act for a UOES capability in fiscal year 1998. Waiting for the Chairman of the Joint Chiefs of Staff's certification following the Limited User Test, an approximate 18-month delay, would cause a demonstration/validation missile fabrication break and permit a UOES capability no sooner than fiscal year 2000, two years later than required by law.

Contrary to the GAO's belief, the primary purpose of the THAAD UOES is not to provide a deployable "interim" system. The THAAD UOES serves three critical functions. First, in priority, the THAAD UOES provides soldiers the opportunity to influence objective system design through early involvement in the execution of the weapon's test program. The THAAD UOES, including the missiles, will support operational effectiveness and suitability testing that includes flight tests, and

Attachment to Memo--GAO
Draft Report--OSD Case 1136
Page 1 of 2

See comment 1.

Appendix I
Comments From the Department of Defense

transportation and durability demonstrations. Second, the THAAD UOES, as a result of the tests and demonstrations, permits early operational assessments; and lastly, if directed by the National Command Authority, the THAAD UOES will provide a theater Commander in Chief a more robust theater missile defense architecture than exists today.

RECOMMENDATION 2: The GAO also recommended that the Secretary of Defense seek legislative relief from the requirements of the 1996 National Defense Authorization Act in regards to acquiring the Theater High Altitude Area Defense (THAAD) UOES by fiscal year 1998. (p. 8/GAO Draft Report)

DOD RESPONSE: Nonconcur. For the benefits cited above, the Department is committed to complying with the Congressionally mandated fiscal year 1998 THAAD UOES date. The Department's recent Ballistic Missile Defense Program decisions affected THAAD's objective system acquisition strategy, but maintained the fiscal year 1998 UOES requirement.

See comment 2.

Attachment to Memo--GAO
Draft Report--OSD Case 1136
Page 2 of 2

The following are GAO's comments on the Department of Defense's (DOD) letter dated May 13, 1996.

GAO's Comments

1. We recognize that the Theater High Altitude Area Defense (THAAD) User Operational Evaluation System (UOES) has three purposes—(1) providing soldiers an opportunity to influence the system's design; (2) conducting early operational assessments of the system; and (3) if directed by the National Command Authority, providing a theater commander in chief with a more robust theater missile defense architecture than exists today. The two primary purposes of UOES set forth by DOD—early user influence on the design and system operation assessment—can be accomplished without contracting for the 40 interceptors. The thrust of our report deals with the risks inherent in the Army's accelerated approach of contracting for interceptors to be deployed before testing provides assurance of the system's effectiveness.

2. The current THAAD UOES schedule provides only 14 of the 40 interceptors by fiscal year 1998—the date the 1996 Defense Authorization Act calls for a UOES capability. Delivery of the 40 interceptors will not be completed until the 3rd quarter of fiscal year 1999.